

JMMC tools

J. Kluska on behalf of the JMMC



JMMC

- ✦ Jean-Marie Mariotti Centre
 - ✦ Network of French laboratories: Grenoble, Nice, Paris and Lyon.
- ✦ Tools for optical interferometry:
 - ✦ Preparing observations
 - ✦ Processing data (reduction, visualisation)
 - ✦ Analysing data (model fitting, imaging)
 - ✦ Databases (OiDB, JMDC, JSDC, BadCal)
 - ✦ Models for interferometry (AMHRA)

Through the full observational data lifetime circle



Prepare
Observations

SearchCal

Reduce
data
amdlb
pndrs

View
Data

OIExplorer

Fit
Models

LITPro

Reconstruct
Images

OImaging

ASPRO

SAMP

OiDB

L0 to L3
DataBases

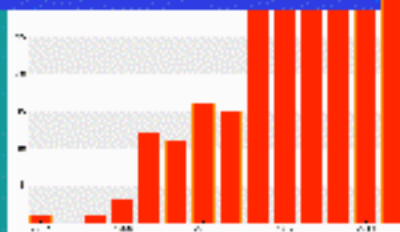
CDS Catalogs

JSDC
JMDC

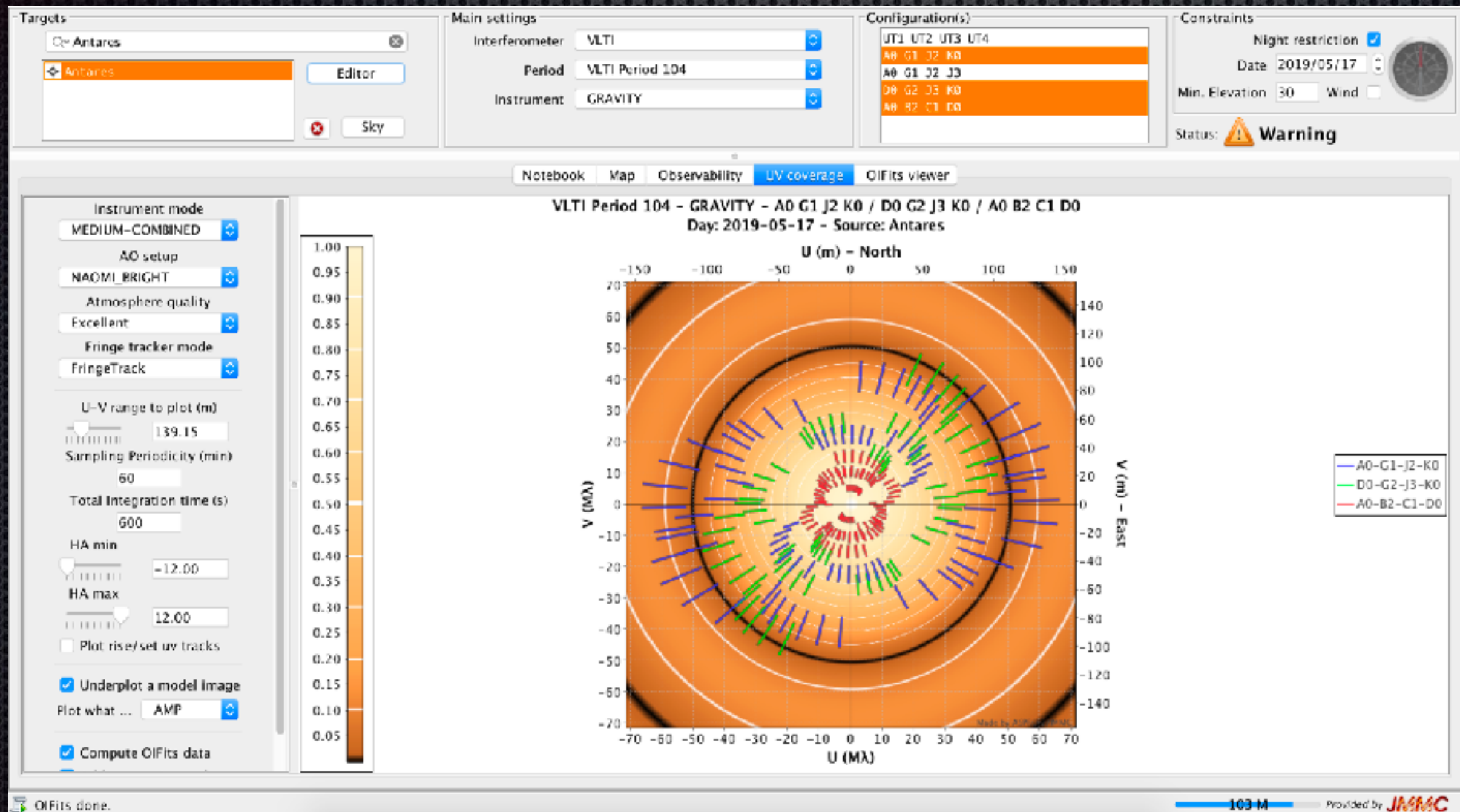
+ Training

+ User Support

+ OLBIN forum
And Publications



ASPRO2: Preparing time proposals or observations

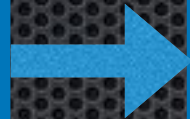


ASPRO2: Preparing time proposals or observations

Select an
observatory and
instrument

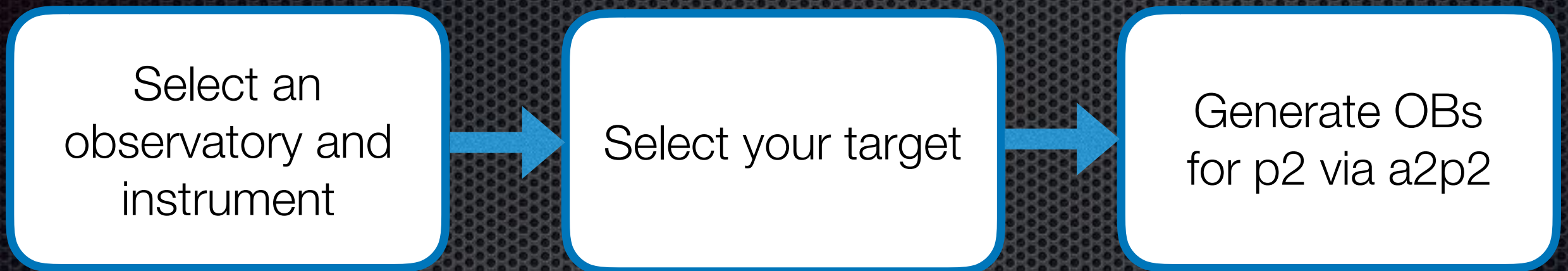
ASPRO2: Preparing time proposals or observations

Select an
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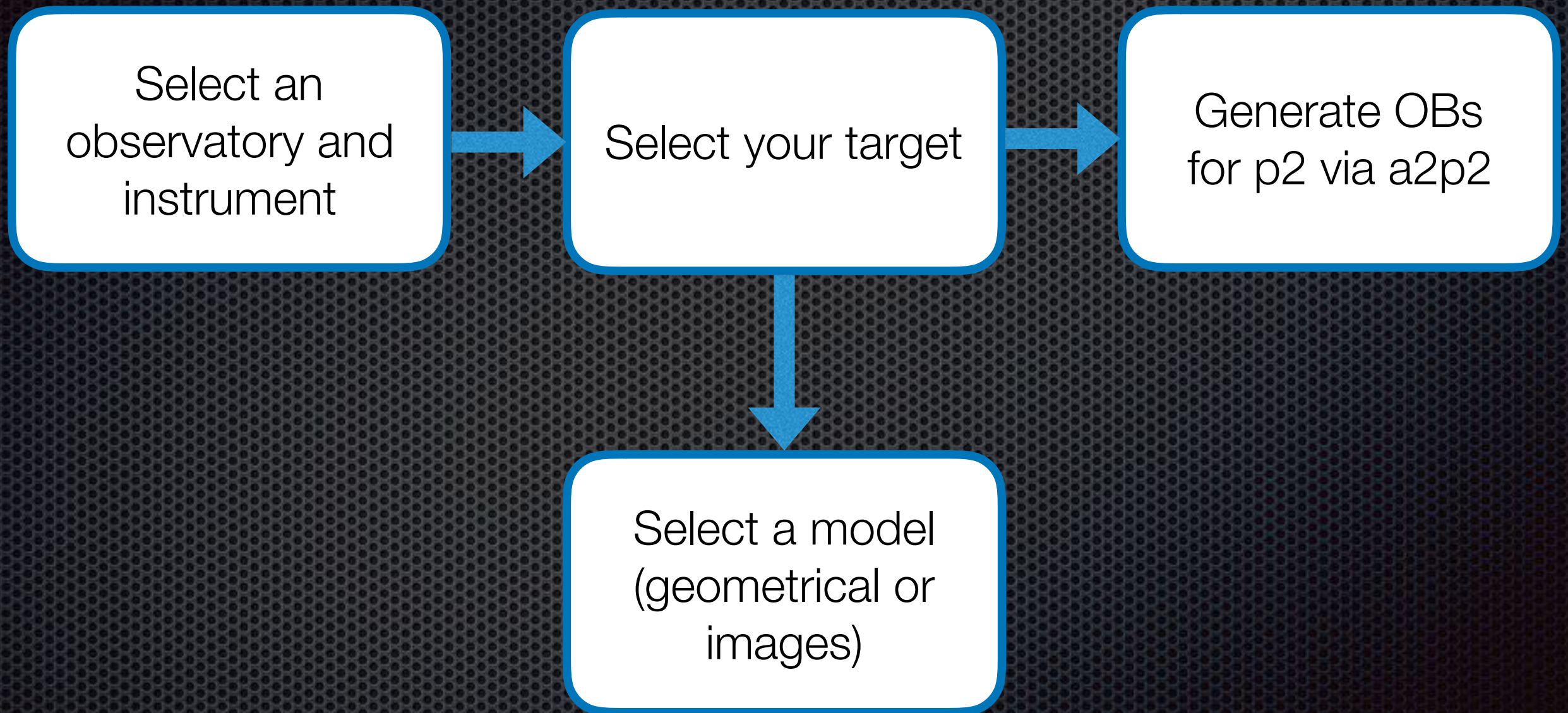


Select your target

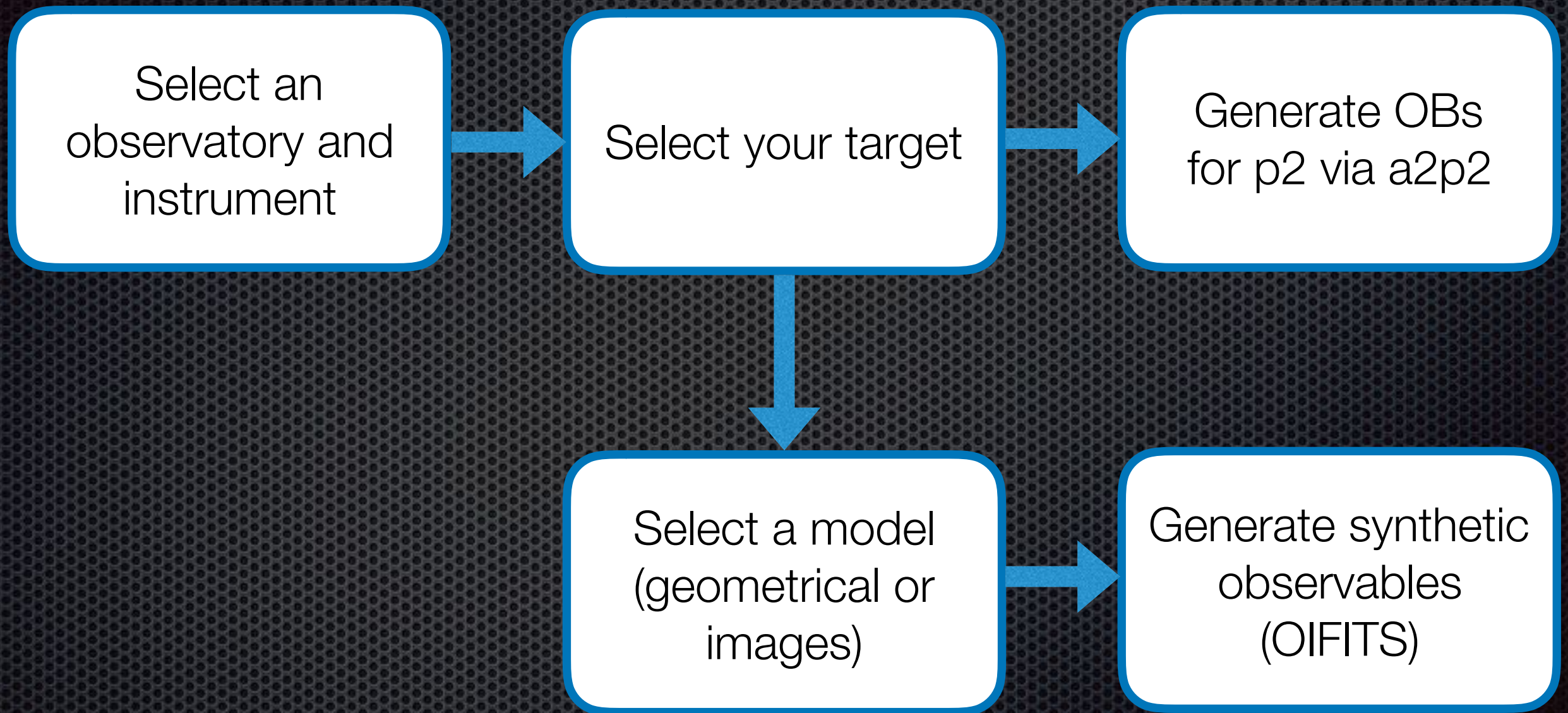
ASPRO2: Preparing time proposals or observations



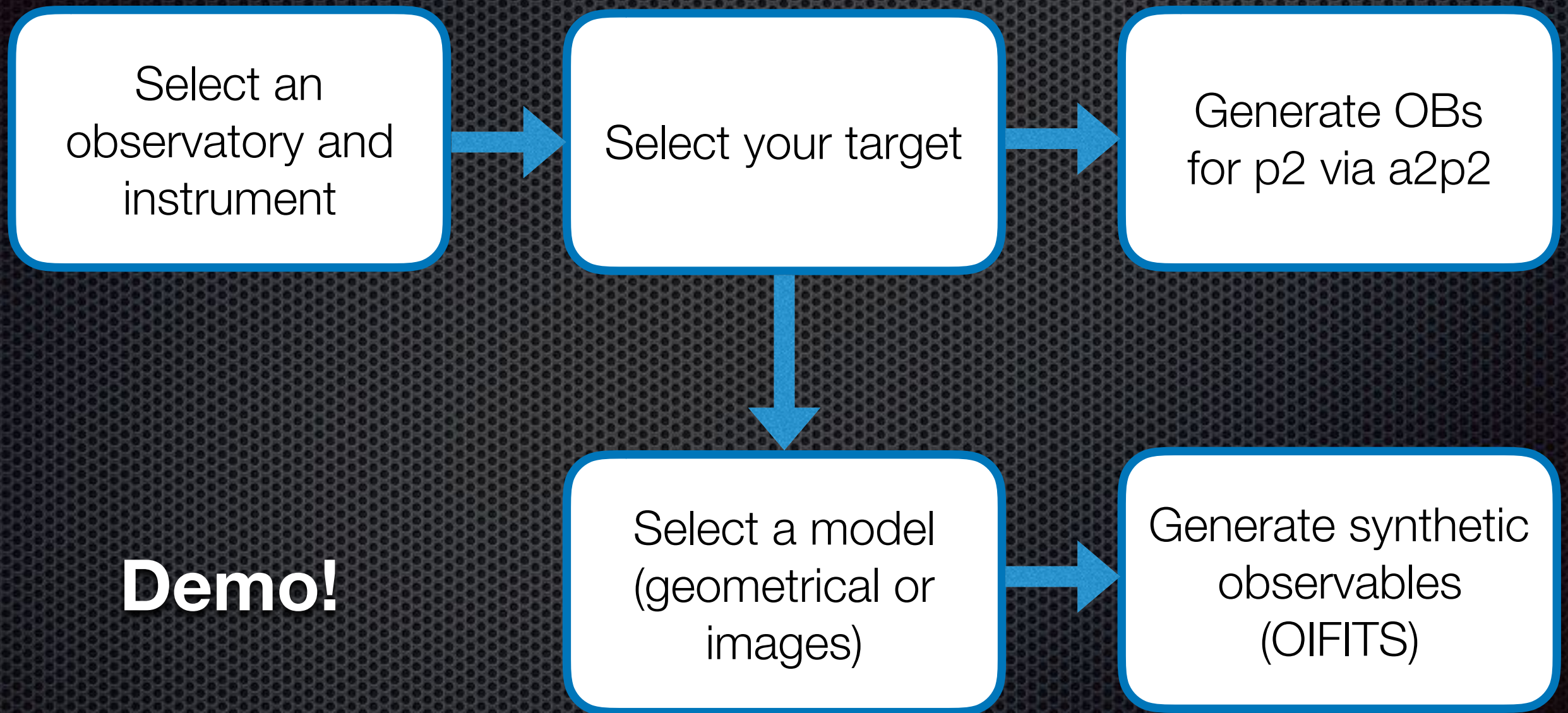
ASPRO2: Preparing time proposals or observations



ASPRO2: Preparing time proposals or observations



ASPRO2: Preparing time proposals or observations



Demo!

SearchCal: Finding optimal calibrators

Query Parameters

1) Instrumental Configuration

Magnitude Band : K

Wavelength (K) [µm] : 2.2

Max. Baseline [m] : 102.45

2) Science Object

Name : Q- HD 100546

RA 2000 [hh:mm:ss] : 11 33 25.4404858122

DEC 2000 [+/-dd:mm:ss] : -70 11 41.239343121

Magnitude (K) : 5.418

3) SearchCal Parameters

Min. Magnitude (K) : 4.4

Max. Magnitude (K) : 6.4

Scenario : Bright Faint

RA Range [mn] : 240.0

DEC Range [deg] : 20.0

Get Calibrators

Progress :

Found Calibrators (1842 sources, 1378 filtered)

Index	dist	HD	RAJ2000	DEJ2000	vis2	vis2Err	diam_chi2	LDD	e_LDD_rel	UD_V	UD_J	UD_H	UD_K	GroupSize	SIMBAD	SpType	ObjType
1	0.39	100560	11 33 32.2166	-70 35 05.2548	0.978	0.001	1.481	0.431	2.302	0.392	0.412	0.412	0.415	0	HD 100560	K2III	.S
2	0.882	101869	11 42 55.0687	-69 50 55.4496	0.978	0.001	0.24	0.434	2.448	0.394	0.414	0.414	0.418	0	HD 101869	K3III	.S
3	1.722	97694	11 13 09.1474	-70 06 48.4020	0.983	8.212E-4	0.535	0.377	2.41	0.344	0.362	0.362	0.364	0	HD 97694	K1III	.S
4	1.755	97900	11 14 25.0678	-69 31 52.3740	0.953	0.002	0.43	0.565	2.445	0.514	0.541	0.541	0.545	0	HD 97900	K3III	.S
5	1.771	103386	11 53 50.0401	-69 56 09.2184	0.985	7.277E-4	0.515	0.357	2.376	0.327	0.343	0.343	0.345	0	HD 103386	K0III	.S
6	2.084	103138	11 52 16.2857	-68 54 53.4132	0.979	0.001	0.731	0.425	2.484	0.386	0.406	0.406	0.409	0	HD 103138	K3III	.S
7	2.283	98582	11 19 27.4025	-68 16 30.7596	0.977	0.001	0.109	0.444	2.242	0.405	0.425	0.425	0.428	0	HD 98582	K1II	.S
8	2.353	98513	11 18 53.6551	-68 13 30.0720	0.985	7.2E-4	0.26	0.355	2.376	0.324	0.341	0.341	0.343	0	HD 98513	K1III	.S
9	2.405	103198	11 52 41.5783	-68 29 28.7700	0.988	7.211E-4	1	0.321	2.912	0.293	0.308	0.308	0.31	0	HD 103198	K1/2III	.S
10	2.453	97693	11 13 13.8362	-68 30 21.3408	0.983	7.98E-4	0.251	0.377	2.344	0.343	0.361	0.361	0.364	0	HD 97693	K2 CNII	.S
11	2.512	102608	11 50 32.5126	-68 11 14.5760	0.973	0.002	1.073	0.485	2.702	0.441	0.464	0.464	0.468	0	HD 102608	K2/3III	.S

Filters

☐ Reject stars farther than : Maximum RA Separation (mn) : 10.0

☐ Reject stars with magnitude : below : 0.0

☒ Reject Spectral Types (and unknowns) : O B A F G K M

☒ Reject Luminosity Classes (and unknowns) : I II III IV V VI

☒ Reject Visibility below : vis2 : 0.5

☐ Reject Visibility Accuracy above (or unknown) : vis2Err/vis2 (%) : 2.0

☐ Reject Variability

☒ Reject Multiplicity

☒ Reject Invalid Object Types

☒ Diameter quality : Maximum chi square : 2.0

Maximum DEC Separation (degree) : 10.0

and above : 10.0

Maximum relative error (%) : 10.0

searching calibrators... done.

1:19 M

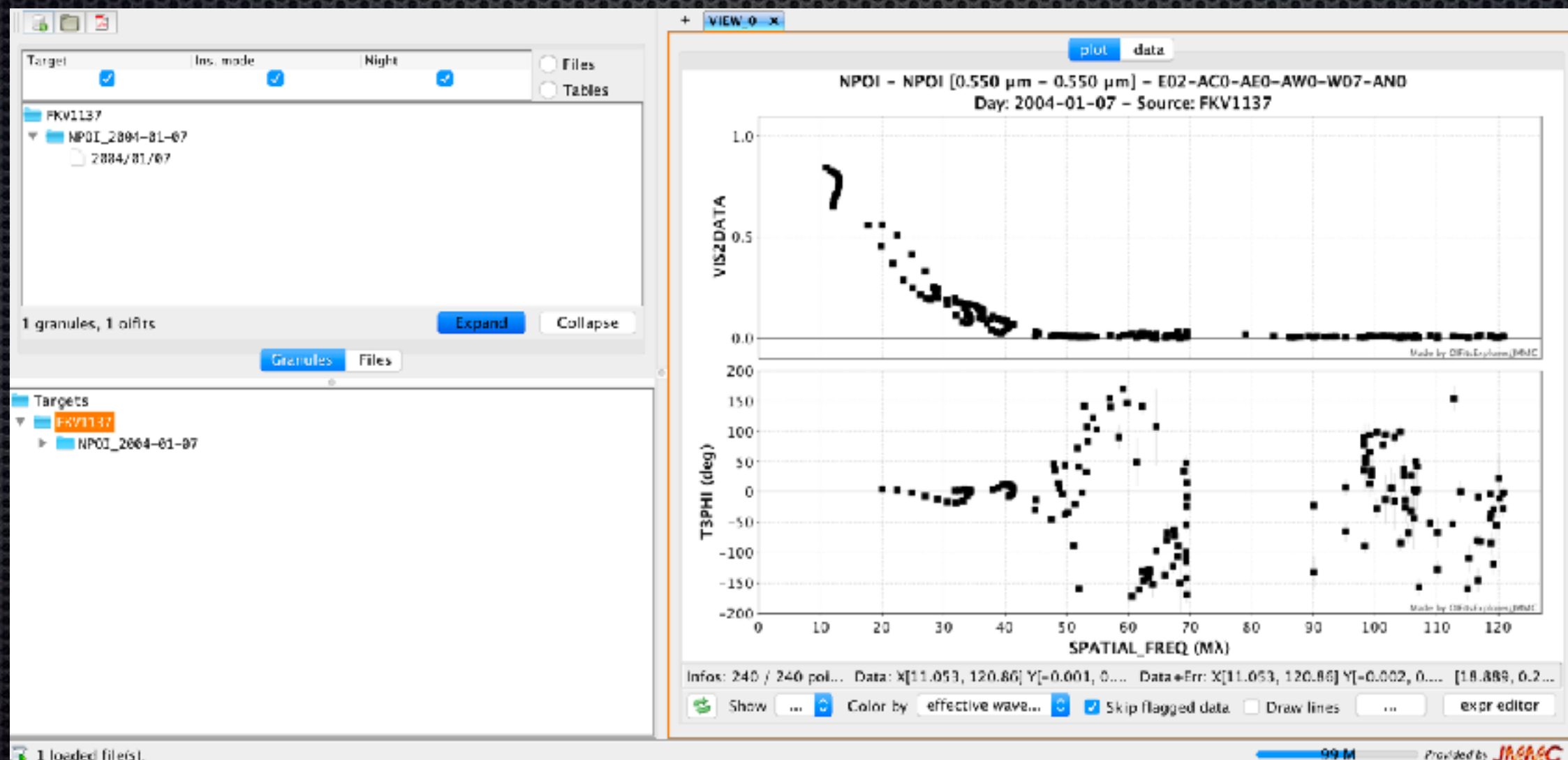
Provided by JMMC

SearchCal: Finding optimal calibrators

- ✦ Finding the closest calibrators (using JMDC and JSDC catalogs)
- ✦ Research criteria include:
 - ✦ Magnitude
 - ✦ Spectral type
 - ✦ Diameter (size, precision)
 - ✦ Variability and multiplicity rejection

OiFitsExplorer: Visualising your data

- ✦ User-friendly interface to visualise your interferometric data



LitPro: Fitting your data

The screenshot displays the LitPro software interface, titled "Untitled.litprox". The interface is divided into several panels:

- Settings tree:** A hierarchical view on the left showing "Settings", "Files", "Targets", and "Plots". The "Targets" folder is expanded, showing "Target [FKV1137]" selected.
- Target panel:** Located on the right, it shows the "Ident: FKV1137" and a "Model list" containing "punct" and "ring". The "ring" model is selected.
- Selected file list:** A list on the right showing the selected file "File[2004-FKV1137-L1L2-examp]".
- Parameters:** A table listing the parameters for the selected model.
- Fitter setup:** A section with checkboxes for "Normalize total flux" (checked) and "Select data to fit" (VISamp, VISphi, VIS2, T3amp, T3phi).
- Plot model panel:** A section with buttons for "Plot image", "Plot UV Map", "Plot Radial", and "Plot sniffer map". It also includes input fields for "xmin", "ymin", "xmax", and "ymax".
- Cuts in the chi2 space panel:** A section at the bottom for setting cuts in the chi2 space.

At the bottom of the interface, a status bar displays the message: "New model ready for modifications! Please load ofits files, select target to fit and build your model." and a progress bar showing "389 M".

Name	Type	Units	Value	MinValue	MaxValue	Scale
punct1.flux_weight1	flux_weight		1	0	0	
punct1.x1	x	mas	0	0	0	
punct1.y1	y	mas	0	0	0	
ring2.flux_weight2	flux_weight		1	0	0	
ring2.x2	x	mas	0	0	0	
ring2.y2	y	mas	0	0	0	
ring2.diameter2	diameter	mas	0	0	0	
ring2.width2	width	mas	0	0	0	

400 UV points > 300 : skip plots

Run fit

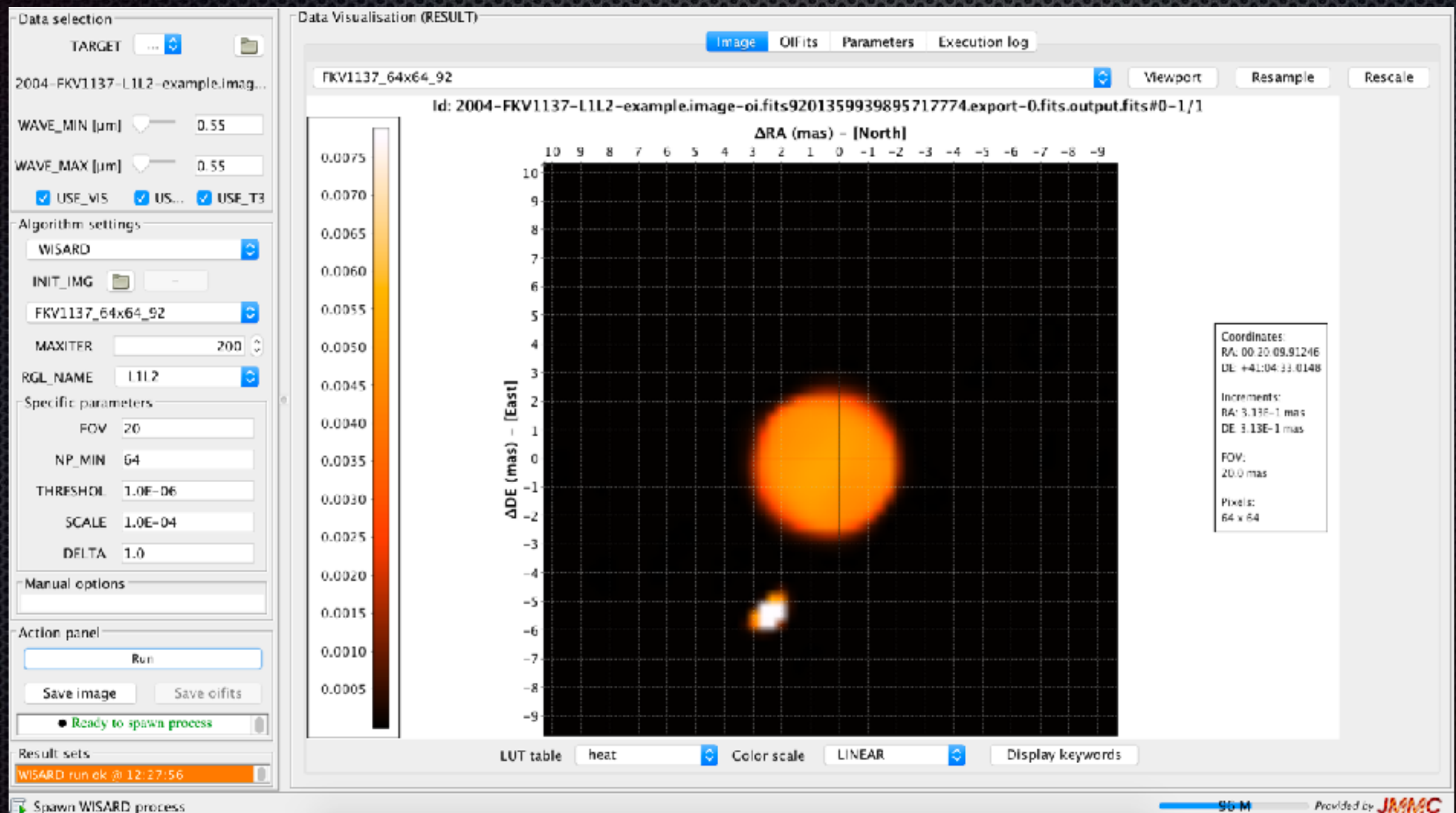
Use max iterations

Provided by JMMC

LitPro: Fitting your data

- ✧ Set of geometric models
- ✧ MCMC fitting algorithm
- ✧ Include several models:
 - ✧ Point source(s)
 - ✧ Disks (uniform, limb darkening)
 - ✧ Rings

OImaging: Image reconstruction



OImaging: Image reconstruction

- ✧ An user-friendly interface for image reconstruction
- ✧ Beta version, released this winter.
- ✧ Includes different algorithms:
 - ✧ BSMEM
 - ✧ MiRA
 - ✧ WIZARD

Models for interferometry - AMHRA



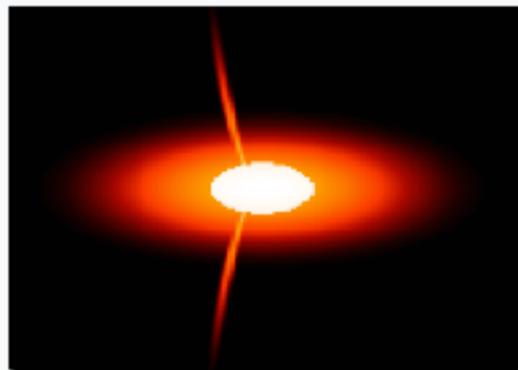
The different types of tools offered or to be offered by AMHRA are:

- Polychromatic images from astrophysical models with fast-computation time (real-time models)
- Polychromatic images from a pre-calculated grid of astrophysical models
- Spectro-interferometric observables from model images (OIFITSModeler)
- Analysis and model-fitting tools for spectro-interferometry

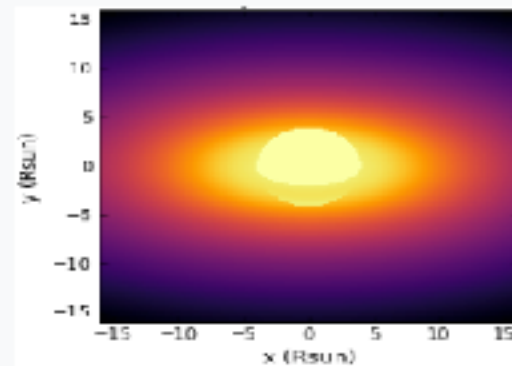
Photo credit : [European Southern Observatory](#)

Real Time astrophysical models

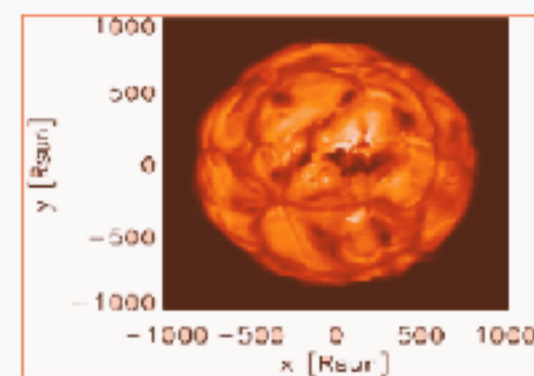
Kinetic Be Disk



Disc and Stellar Continuum (DISCO)



Evolved stars(RSG,AGB)
with CO5BOLD



JMMC databases

- ✧ OiDB: Base de données interférométriques
- ✧ JMDC: JMMC Measured Diameter Catalog
- ✧ JSDC: JMMC Stellar Diameter Catalog
- ✧ BadCal: Bad Calibrator Catalog

Try it at home!

- ✧ Visit the JMMC website:
 - ✧ www.jmmc.fr / jmmc-new.osug.fr
- ✧ The interferometric database is on oidb.jmmc.fr
- ✧ Give feedback, report errors and suggest ideas for improvement!
- ✧ Please acknowledge the use of JMMC tools in your papers :)

Demo

- ✧ ASPRO2 + SearchCal
- ✧ LITPro
- ✧ Olmaging
- ✧ Oidb